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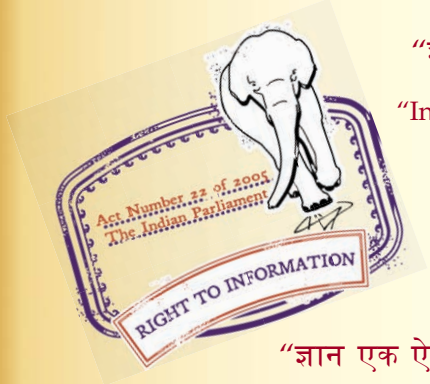
IS 12259 (2001): SKI-Poles for Alpine Skiing - Safety Requirements and Test Methods [PGD 27: Mountaineering Equipment]



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"Knowledge is such a treasure which cannot be stolen"

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IS 12259 : 2001
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भारतीय मानक

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(पहला पुनरीक्षण)

Indian Standard

SKI-POLES FOR ALPINE SKIING — SAFETY REQUIREMENTS AND TEST METHODS

(First Revision)

ICS 97.220.20

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

March 2001

Price Group 6

NATIONAL FOREWORD

This Indian Standard (First Revision) which is identical with ISO 7331 : 1990 'Ski-poles for alpine skiing — Safety requirements and test methods' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendations of Mountaineering Equipment Sectional Committee and approval of the Basic and Production Engineering Division Council.

This standard was originally published in 1987 and was based on draft International Standard ISO/DIS 7331 'Ski-poles for alpine skiing — Technical requirements for safety and test methods'. The revision has been taken up to harmonize with the latest version of International Standard ISO 7331 : 1990. The following major changes have been made in this revision:

a) The lower limit of group B has been revised as $l_N \geq 900$ mm;
b) Information about special designs is included in the Scope;
c) Test length for test sample for groups A and B have been modified;
d) The impact area of group C has been revised to minimum 12 cm^2;
e) For maximum compressive force, test lengths have been modified;
f) Examples have been added for Anti-catching design of basket;
g) Hardness requirement has been included as new property; and
h) Marking requirement for special design has been added.

The text of ISO standard has been approved as suitable for publication as an Indian Standard without deviations. In this adopted standard, certain terminology and conventions are not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words International Standard appears referring to this standard, they should be read as Indian Standard.
b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their place are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 554 : 1976	IS 196 : 1966 Atmospheric conditions for testing (*first revision*)	Modified
ISO 6508 : 1986	IS 1586 : 1988 Method for Rockwell hardness test for metallic material (Scales A-B-C-D-E-F-G-H-K) (*second revision*)	do

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

SKI-POLES FOR ALPINE SKIING — SAFETY REQUIREMENTS AND TEST METHODS

(First Revision)

1 Scope

This International Standard specifies the minimum requirements for safety in ski-poles for alpine skiing and gives test methods to check conformity with these requirements.

It applies to ski-poles for alpine skiing in the following ranges of nominal length, l_N (see clause 3):

- group A, $l_N \geq 1\,100$ mm (adults' poles)
- group B, 1 100 mm $> l_N \geq 900$ mm (junior poles)
- group C, $l_N < 900$ mm (children's toy-poles)

Special designs may deviate from this International Standard, but are required to be marked durably as special designs (see 8.2).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 554 : 1976, *Standard atmospheres for conditioning and/or testing — Specifications.*

ISO 6508 : 1986, *Metallic materials — Hardness test — Rockwell test (scales A — B — C — D — E — F — G — H — K).*

3 Terms, symbols and units

3.1 Terms

Terms used to designate the different parts of a ski-pole are given in figure 1.

There are two types of grips for ski-poles:

- grips with a strap;
- strapless grips.

3.2 Symbols and units

The symbols used in figure 2 relate to the following concepts, which shall be expressed in the units given:

A_G = upper surface of the grip, in square centimetres (impact area)

$-F_z$ = compressive force in the axis of the ski-pole, in newtons

l_T = total length, in millimetres

l_N = nominal or effective length measured from the tip to the upper surface of the fist, in millimetres

l_H = length measured from the tip to the middle of the hand, in millimetres

l_B = length measured from the tip to the lower surface of the basket, in millimetres

d_B = maximum diameter of the basket, in millimetres

The nominal length l_N shall be marked on the ski-pole (see clause 8).

The lengths l_N and l_H are determined by means of an average hand, with a width of

group A: 93 mm

group B: 73 mm

group C: 57 mm

4 Materials

The materials used shall meet the requirements prescribed in this International Standard.

5 Test conditions

Unless otherwise specified, the test shall be carried out as a type test in the standard atmosphere indicated in ISO 554 with reduced tolerances.

The reference value for the quasi-static structure of force is

$$\frac{dF}{dt} < 100 \text{ N/s}$$

The test equipment shall be such that all measurable variables such as forces, temperatures, angles, lengths, surfaces, weights and time of oscillation can be measured or determined to the following accuracies:

Forces, weights	± 2 %
Temperatures	± 2 °C
Angles	± 1°
Lengths of poles	± 1 mm
Radii and other lengths	± 0,2 mm

6 Test sample

For the test, three poles each from the longest and from the shortest lengths of one group shall be submitted to the testing establishment.

In addition, for testing of group A three poles of 1 200 mm length and of group B three poles of 1 000 mm length shall be submitted to the testing establishment.

One long pole and one short pole shall be selected for the tests in accordance with 7.2 to 7.9.2.

If one test sample fails these tests, the tests may be repeated with two further test poles, both of which then have to pass the tests.

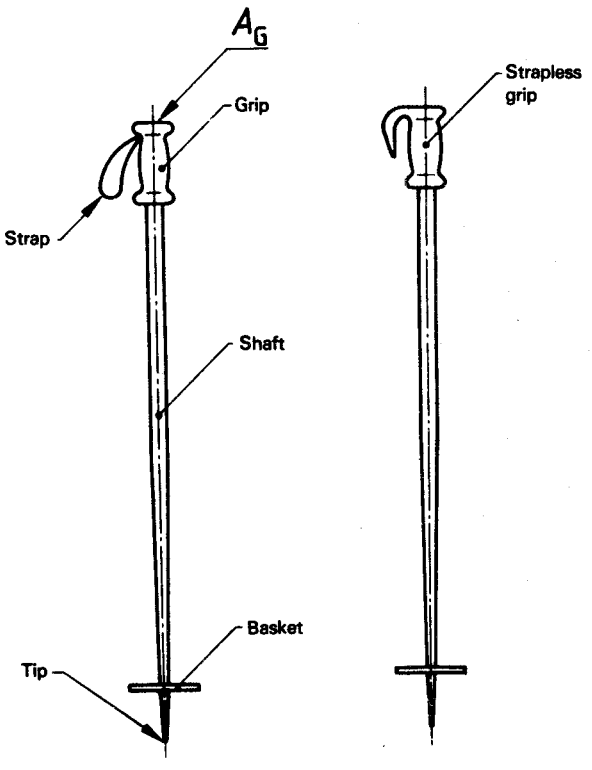


Figure 1 — Ski-pole — Terms

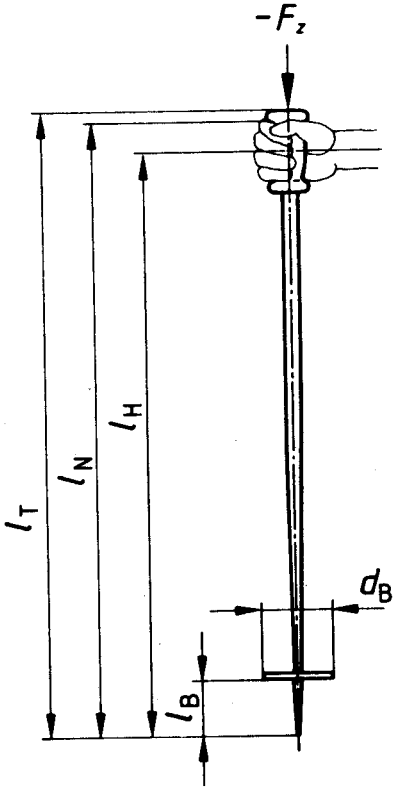
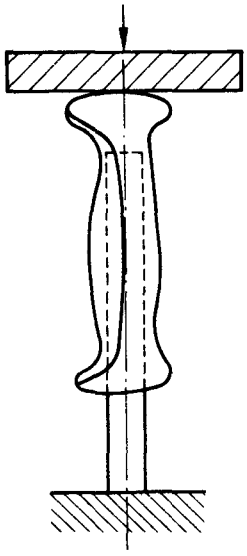
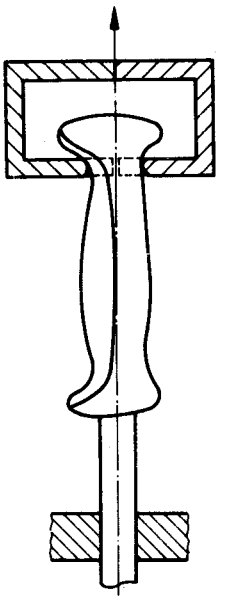


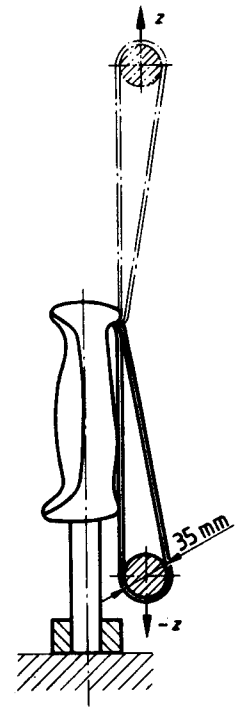
Figure 2 — Centre of rotation and dimensions

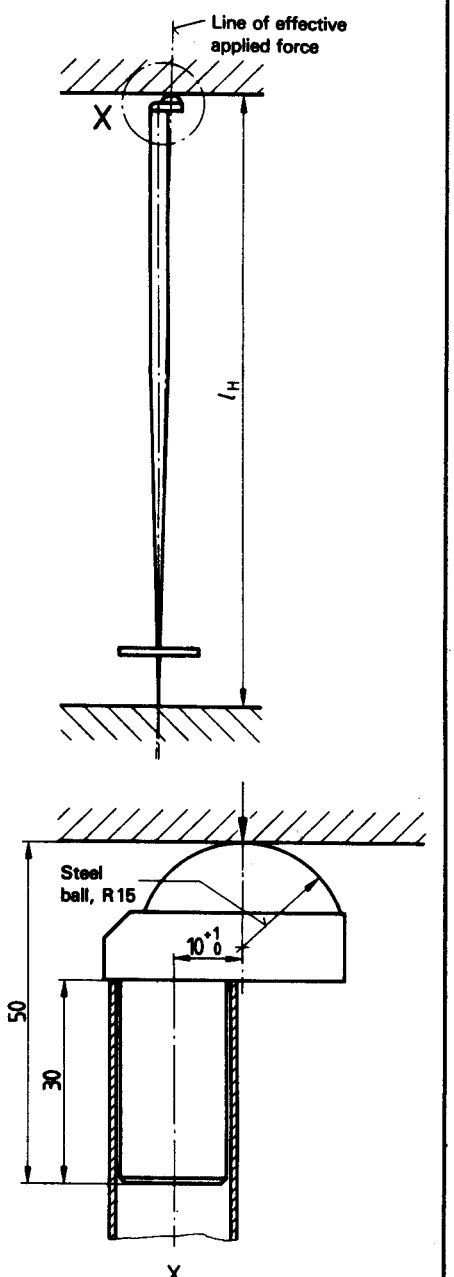
7 Technical requirements for safety and methods of test

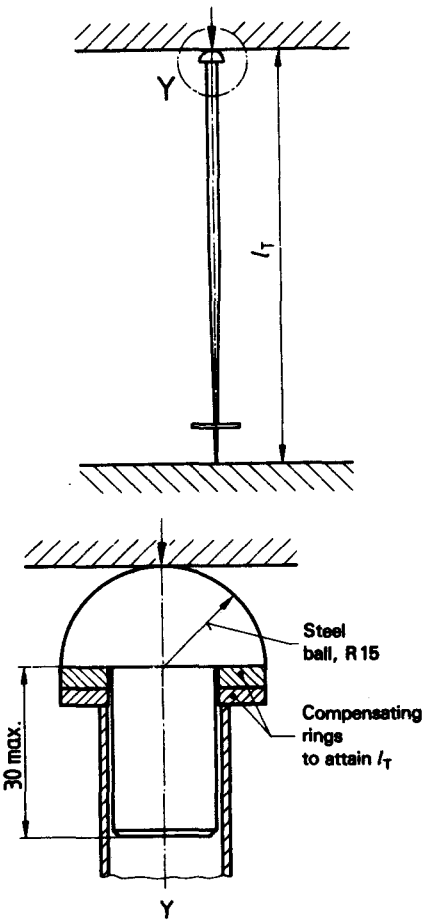
No.	Property	Requirement	Method of test
7.1	**Nominal length**	The nominal length l_N shall not vary from the given length by more than ± 10 mm. Furthermore the lengths of one pair of ski-poles shall not differ by more than 7 mm.	Determine lengths of all test samples indicated in clause 6.
7.2	**Outward design**	Sharp design (except the tip) and rough surfaces, which might cause injury, shall be avoided.	Check visually.
7.3	**Anti-catching design**	The ski-pole shall be so designed that no dangerous strain can be transmitted to the wrist and arm of the skier, should the pole get caught during skiing. This requirement can be met by a design according to 7.6.3 or 7.8.4, or by a strapless grip.	Test according to 7.6.3 or 7.8.4, or visual and functional test.
7.4	**Release mechanism**	If so equipped a release mechanism shall be manufactured so that correct functioning is guaranteed in environmental conditions encountered during skiing.	
7.4.1	**Temperature and ice conditions**	If a release mechanism is provided in the shaft, the compressive force in the axis of the pole necessary to cause the release at a temperature of −20 °C and in icy conditions, and at a temperature of 20 °C shall not vary by more than 30 %. In addition, the release force at −20 °C and in icy conditions shall not exceed values given in 7.6.3.	Determine the release force at room temperature five times per function on one test sample and calculate the mean value. Store the release mechanism at a temperature of −20 °C until this temperature is reached. Then determine the release force once and compare it with the mean value at 20 °C. Again determine the release force at room temperature five times on one test sample and calculate the mean value. Spray the vertically placed ski-pole with water at 10 °C or more for 1 min from a distance of 1 m, and then store the pole vertically at −20 °C until it reaches this temperature. Then determine the release force once and compare it with the mean value at 20 °C.
7.4.2	**Fatigue conditions**	The release mechanisms shall be protected against wear so that they still function correctly after 100 releases. The release forces shall not vary by more than 20 % after the fatigue test.	Carry out 100 releases on each release mechanism; compare the mean value of the first five releases with the mean value of the last five.
7.5	**Grip**		
7.5.1	**Shape**	The shape of the grip shall be designed to facilitate good control of the pole, i.e. the grip shall be shaped to the hand and not be slippery. With all grips, whether straps are included or not, the shape of the moulded portion shall not be such as to force the thumb outward or upward, beyond the edge of the impact area A_G of the top of the handle/grip.	Visual and manual testing.

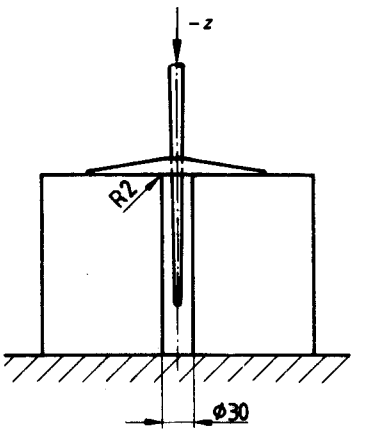
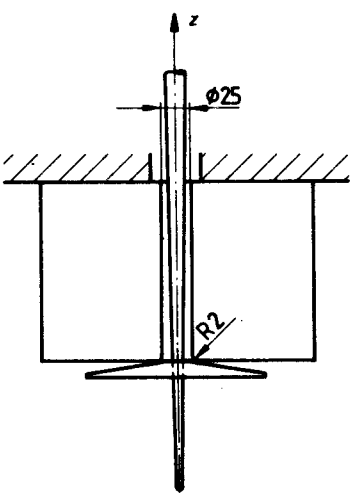
No.	Property	Requirement	Method of test
7.5.2	**Impact area**	The impact area A_G shall be group A: at least 25 cm^2 group B: at least 18 cm^2 group C: at least 12 cm^2	Designate the largest section, taken from the outer contour at a level between 0 and 10 mm from the upper edge of the grip and at a slope of between 0 and 10° to the perpendicular; this shall be the impact area. In the case of deformable surfaces of the grip, this measurement can be carried out at a compressive force of 400 N.
7.5.3	**Edges**	Edges on the grip which could cause injury shall have a radius of at least 2,0 mm.	Visual and dimensional testing.
7.5.4	**Piercing resistance**	The piercing resistance of the impact area A_G to the top of the shaft, that is the force necessary for the shaft to pierce the impact area upwards, shall be higher by at least 100 % than the maximum compressive force, or than the maximum release force of poles with a release mechanism.	Press a test sample against a fixed abutment by means of a plate (see figure 3). When the double compressive force, determined according to 7.7.2, is applied, the shaft shall not pierce the end of the grip. The test shall be carried out quasi-statically.  **Figure 3 — Test arrangement for piercing resistance**

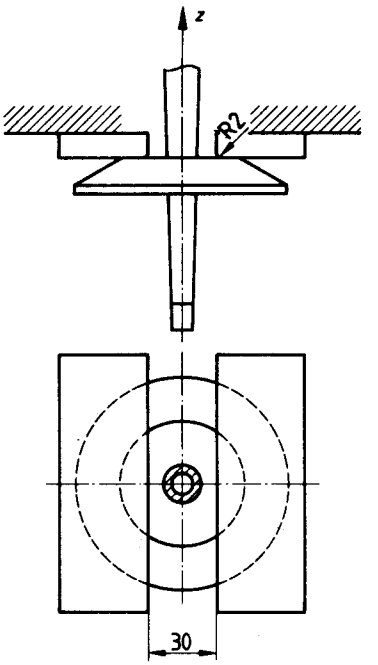
No.	Property	Requirement	Method of test
7.5.5	**Pulling-off force**	The force needed to pull the grip from the shaft shall be group A: at least 500 N group B: at least 400 N group C: at least 300 N	Carry out the test on a test sample in accordance with figure 4. The test shall be carried out quasi-statically.  **Figure 4 — Test arrangement for pulling-off force**
7.5.6	**Strapless grips**	The bow of strapless grips shall be designed in such a way that catching or twisting the wrist is avoided.	Check visually.
7.6	**Straps**		
7.6.1	Width	Straps with a supporting function shall have the following width where near the hand: group A: at least 16 mm group B: at least 14 mm group C: at least 12 mm	Visual and dimensional test.

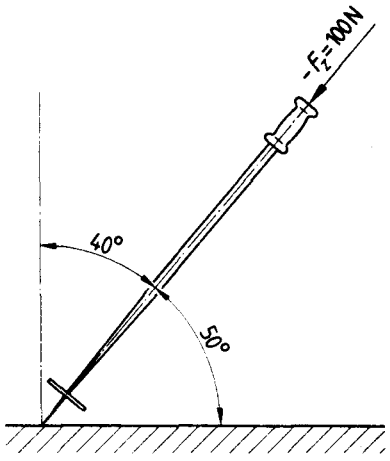
No.	Property	Requirement	Method of test
7.6.2	**Minimum strain in support direction**	Straps with a supporting function (i.e. groups A and B) shall withstand a force in the loading direction $-z$ of at least 350 N. Straps in group C have no supporting function.	Carry out the test quasi-statically according to figure 5 by applying the force in the direction $-z$.  **Figure 5 — Test arrangement for the strap**
7.6.3	**Release function**	Straps with a release function shall have the following range of release values in the direction z within a range of temperature from 20 °C to −5 °C: group A: 80 N to 240 N group B: 60 N to 180 N NOTE — Further evaluation of accident statistics is needed to determine more extensive requirements concerning the direction of strap release from different types of fall, etc.	Determine release forces in direction z quasi-statically according to 7.4 and figure 5.

No.	Property	Requirement	Method of test
7.7	**Shaft**		
7.7.1	**Minimum compressive force**	The shaft shall be designed to withstand compressive forces and bending moments occurring during all aspects of skiing without plastic deformation or fracture. No permanent deformation shall occur when loading the pole with a compressive force in the axis of the pole of group A: 500 N group B: 450 N group C: 300 N	Test the longest ski-pole of one series, taking l_H as the test length. Carry out the test quasi-statically between two parallel plates and with the pole fixed off-centre (see figure 6). Test bent poles in such a way that buckling is promoted. Dimensions in millimetres  **Figure 6 — Test arrangement for the determination of the minimum compressive force**

No.	Property	Requirements	Method of test
7.7.2	**Maximum compressive force**	For group A, to obtain the best possible protection against injury to a skier falling on the impact area A_G, the ski-pole shall buckle on its axis under a maximum compressive force of 937 N, or shall be so designed as to glance off upon impact with the body of a skier. In the case of higher compressive forces the impact area shall be increased so that a surface pressure of 37,5 N/cm^2 is not exceeded. For group B, a surface pressure of 37,5 N/cm^2 is permissible. For group C, no requirement is specified.	Test three poles of group A with a length of 1 200 mm and three poles of group B with a length of 1 000 mm, taking l_T as the test length. The mean value of three tests shall fulfil the requirements. Carry out the test quasi-statically between two parallel plates, and with the pole fixed centrally, to a tolerance of ± 2 mm (see figure 7). Dimensions in millimetres  **Figure 7 — Test arrangement for the determination of the maximum compressive force** In the case of ski-poles with other safety features to glance off the direction of fall, determine the maximum compressive force on the end surfaces of the test samples at the moment of impact from a released falling weight.

No.	Property	Requirement	Method of test
7.7.3	**Point of buckling**	In the test the ski-pole shall neither break into two parts nor splinter dangerously when compressed to 2/3 l_H.	Test in accordance with figure 6.
7.8	**Basket**		
7.8.1	**Dimensions**	The dimensions of d_B and l_B (see figure 2) shall be chosen to fulfil 7.9.2.	Test as in 7.9.2.
7.8.2	**Resistance**	The basket on the ski-pole shall withstand without fracture a surface force corresponding to the following forces in the direction $-z$ at a temperature of -20 °C: group A: 750 N group B: 600 N	Carry out the test quasi-statically at a temperature of -20 °C on one test sample each in accordance with figure 8 (direction $-z$) and figure 9 (direction z) in the case of 7.8.3. Dimensions in millimetres  **Figure 8 — Test arrangement for the basket and basket fixing in the direction of compression**
7.8.3	**Basket fixing**	The fixing of the basket shall withstand forces according to 7.8.2 without fracture in both directions z and $-z$ at a temperature of -20 °C. During the resistance test the movement of the basket on the shaft shall not exceed ± 3 mm.	Dimensions in millimetres  **Figure 9 — Test arrangement for the basket fixing in the direction of the tensile force**

No.	Property	Requirement	Method of test
7.8.4	**Anti-catching design of basket**	If there is neither a strapless grip nor a release function strap it shall be possible to pass the basket through a gap with a maximum force according to 7.6.3 at −20 °C (see figure 10). The basket pattern shall be designed to avoid catching (e.g. no gaps or openings).	Dimensions in millimetres  **Figure 10 — Gap for testing the basket**
7.9	**Tip**		
7.9.1	**Minimum area**	To reduce the danger of penetration, the section of the tip of the pole, measured perpendicular to the axis of the ski-pole at a distance of group A: 2 mm group B: 2 mm group C: 1 mm for the extreme point, shall have a minimum area of 50 mm^2	Dimensional test.

No.	Property	Requirement	Method of test
7.9.2	**Gripping power on ice**	The tip shall afford a good grip on ice for groups A and B. This requirement is fulfilled if the ski-pole does not slip after a 40° rotation from a plane perpendicular to the ice surface resulting in a maximum inclined angle of 50°.	Bring a ski-pole and ice (with a smooth plane surface) to a temperature of −20 °C. Place the ski-pole perpendicularly under a force $-F_z$ of 100 N and, while maintaining this force, rotate it from the perpendicular plane towards the ice surface to an angle of 40°. The test shall be carried out within 10 s.  **Figure 11 — Test of ice gripping power**
7.9.3	**Hardness**	The hardness of the tip shall be at least HRC 50.	Test in accordance with ISO 6508.

8 Marking

8.1 Ski-poles conforming to this International Standard shall be marked ISO 7331, with the relevant code letter and the nominal length l_N in centimetres together with the name or trade mark of the manufacturer.

EXAMPLE

ISO 7331 — A — 130 — ... (manufacturer)

8.2 Special designs, e.g. racing poles, poles for trick skiing, and adjustable poles for touring, which deviate from this International Standard in some respects, shall be marked durably as special constructions.

NOTE — Such deviations imply design details, necessary for functional reasons, e.g. a higher compressive force.

Non-conformity with this International Standard shall be clearly indicated on the pole.

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Amendments Issued Since Publication

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